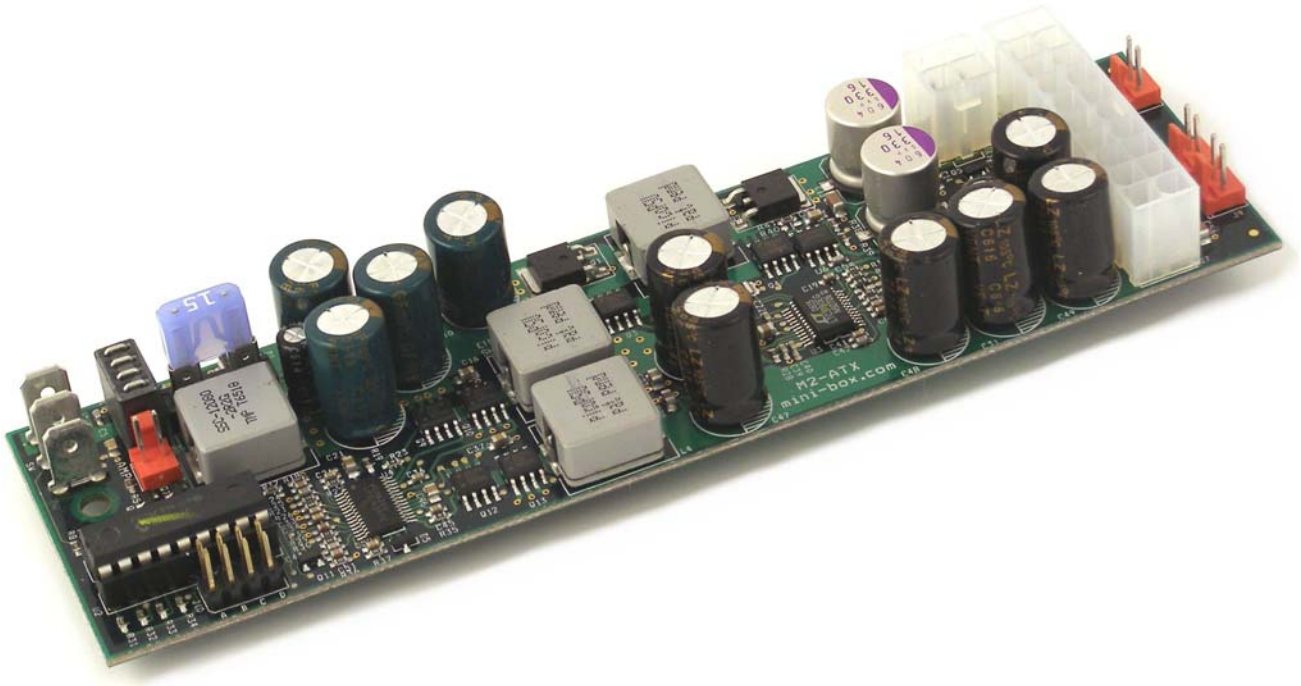
User Manual

for the

820153 DC-DC Power Supply 150W 10-25Vin



Introduction

The 820153 DC-DC Power Supply is a fully compliant ATX power supply designed to power a wide variety of motherboards like the 786LCD/mITX, 886LCD-M and 986LCD-M families of boards. It has included cable kit inclusive ATX+12V cable, as required by the 986LCD-M family, and it is supporting a wider temperature range than the standard embedded PC range 0 - 60ºC.

The power supply can be operated in two types of modes: “Standard ATX Supply Mode” and “Battery Driven Application Mode”. The input power voltage shall be 10 – 25V except for Battery Driven Application Mode where the minimum power input voltage is 11.2V (down to 8V is allowed for maximum 1 minute). The power input is protected against over-voltage transients, short circuits (>15A) and in Battery Driven Application Mode the battery is protected against Deep Discharging.

In order to estimate if the DC-DC Power Supply is suitable for a specific project the following table can be used.

The allowed load (without forced air) can be compared to the maximum load of the actual board. Maximum load from LCD, HDD, PCI, AGP cards must be taken into consideration to make sure none of the outputs is overloaded. The “green” numbers are the available power for these loads.

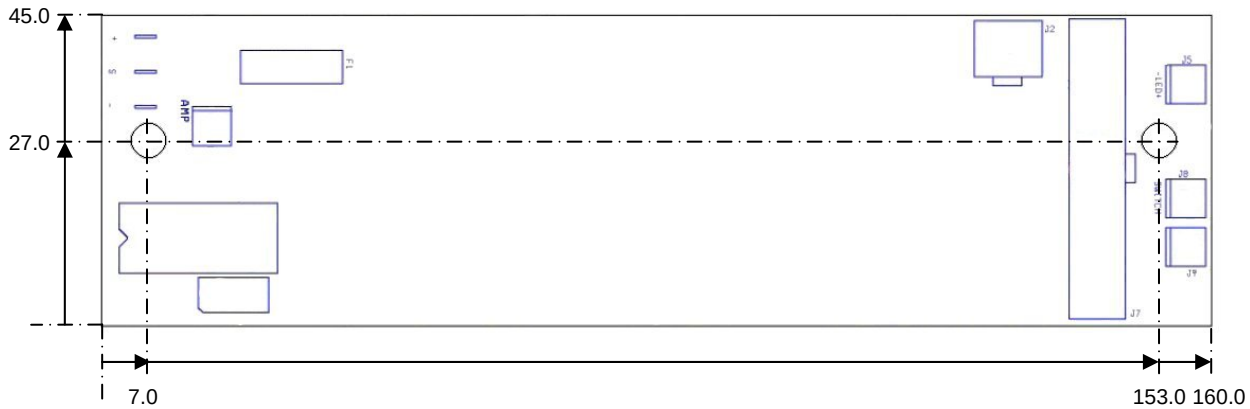
Voltage Output	Max load / [A] (fan less)	Peak Load / [A] (< 60 sec.)	786LCD/mITX				886LCD-M				986LCD-M Duo 2GHz Load / [A]	
			733/133 Load / [A]		400/100 Load / [A]		1600/400 Load / [A]		800/400 Load / [A]			
5V	6	12	1,7	4,3	1	5	4,7	1,3	3	3	2,5	3,5
5VSB	1,5	2	0,24	1,25	0,24	1,25	1,2	0,3	1,2	0,3	?	?
3.3V	6	12	3,2	2,8	2,5	3,5	2,6	3,4	2,6	3,4	1,3	4,7
-12V	0,11	0.2	-	0,11	-	0,11	-	0,11	-	0,11	-	0,11
12V	5,25	9	0,4	4,85	0,3	4,95	0,6	4,65	0,6	4,65	2,7	2,55

The M2-ATX comes with complete cable harness consisting of:

- ATX cable (250mm) with 2x HDD power plugs and 1x FDD power plug.
- ATX+12V Power cable (mm).
- Power input wires, 3 pieces (red, black and white) (300mm) open-ended.
- 2 wire cable for implementing PSU controlled motherboard Power On Button. (Note 1)
- Set of Jumpers to select between various power sequencing schemes. (Note 1)

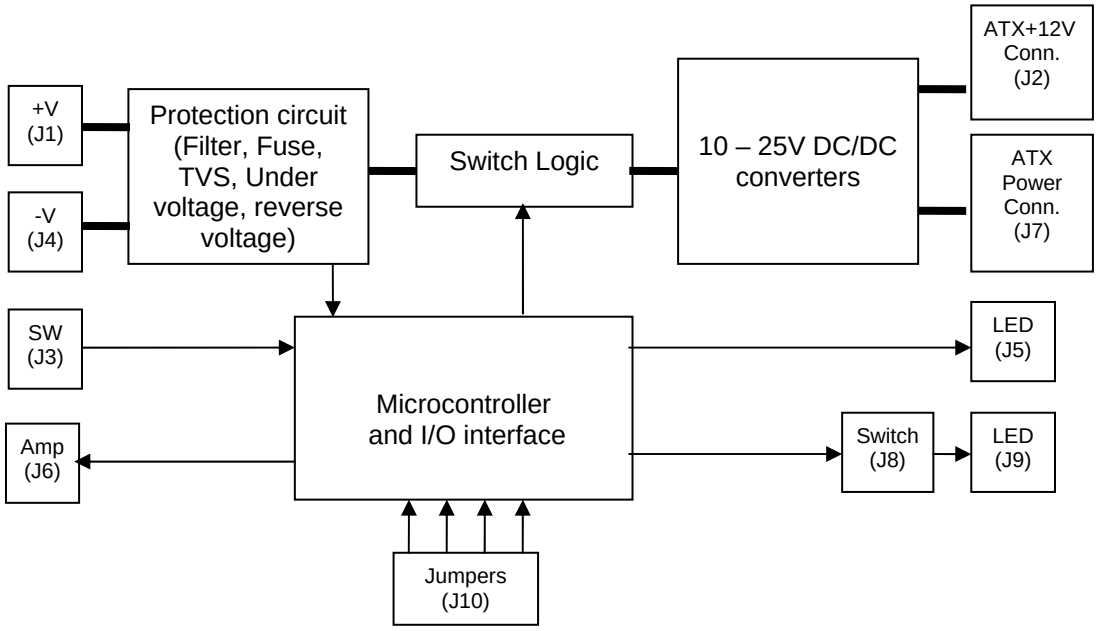
Note 1: Used for battery driven application. Not needed for standard ATX PSU mode.

Mechanical Drawing

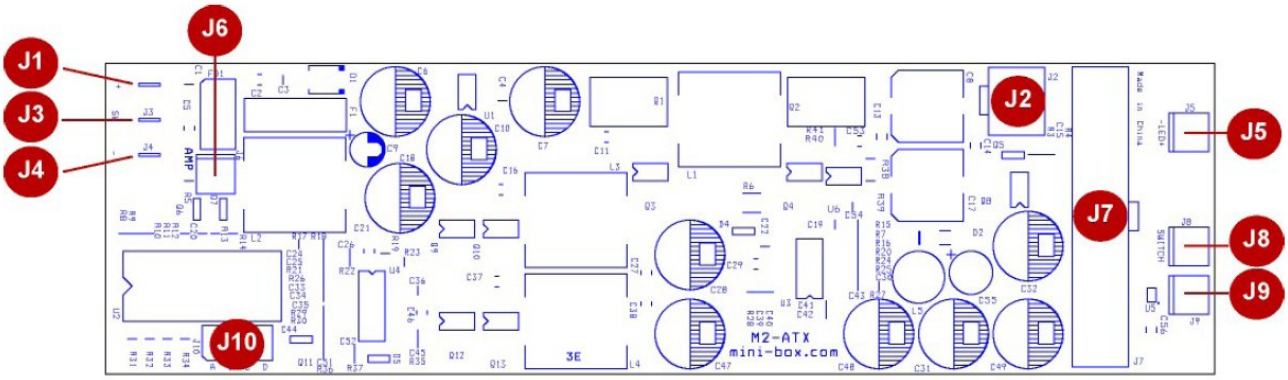


Measures in mm.

Functional diagram



Connector position



J1 = +V
J2 = ATX+12V
J3 = SW
J4 = -V
J5 = LED
J6 = AMP
J7 = ATX Connector
J8 = Switch
J9 = Switch
J10 = Jumpers

Functional/Connector description

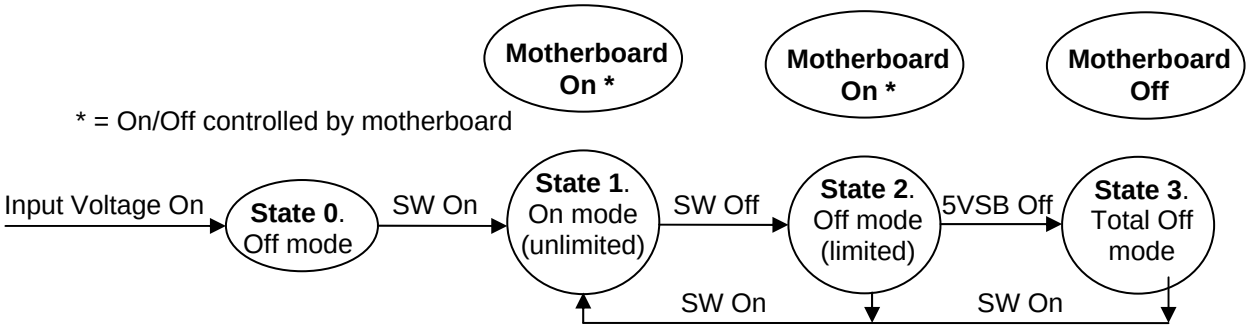
+V (J1) is for 10 – 25V power input (Vin) with reference to –V (J4).

-V (J4) is Ground reference to +V (J1).

SW (J3) Switch On/Off signal input to be used in Battery Driven Application Mode.

This input shall be left unconnected when the PSU is used in Standard ATX Supply Mode (no Jumpers installed in J10). As long as Vin is available the +5VSB will be present and it is up to the motherboard to turn on and off motherboard.

This input shall be used in Battery Driven Application Mode (1 – 3 jumpers installed in J10). The SW input is used to tell the PSU to automatically turn on the motherboard and later to turn off again after a selectable delay (seconds, minutes or hours range) by automatically start motherboard shutdown procedure. When the motherboard is shutdown it is possible that also the +5VSB will turn off after a certain delay



SW	State	Action description
OFF	0	Nothing happens. (Waits for SW to be turned to the ON-position).
ON	1a	Waits for 2 seconds.
	1b	Turn on the 5Vsb rail and wait 1 second.
	1c	Generate a Power On Button pulse on J8 and J9. Then the Motherboard shall turn on the supply by activating the PSON # signal (ATX signal). If J8 or J9 are not used for Power On Button, then Motherboard waits for Power On Button activated or it turns on automatically if selected in BIOS to do so.
	1d	Wait for the SW to turn OFF
OFF	2a	Waits for 5 sec., 30 sec, 30 min. or 3 hours (OFFDELAY) depending on the selected Battery Driven Application Mode (selected by Jumpers in J10). If SW is turns ON before the delay elapse then go to state 1d
	2b	Generate a Power On Button pulse on J8 and J9, so that the Motherboard will initiate the Shutdown Procedure. Please notice that if J8 or J9 is not connected to Power Button input on Motherboard then Motherboard Shutdown Procedure will not be initiated.
	2c	Waits for 45 sec., 2 hours or “Forever” (5VSB Off Delay) depending on the selected Battery Driven Application Mode (selected by Jumpers in J10). When “Forever” is selected then the input voltage is monitored and if it gets below 11V for more than one minute, the “Forever” delay will terminated until the input voltage gets higher than 11V. Please notice that if the Motherboard is rebooted by manual Power On Button, then all power lines will be turned off, as selected by the 5VSB Off Delay, without the Shutdown procedure has been carried out. If SW is turns On before the delay elapse then go to state 1a If Input Voltage is removed then go to state 0.
	3	Total Off mode. Mother board can not be turn on by Push Button. When SW goes ON then go to state 1a

Jumpers (J10)

By use of up to 3 Jumpers it is possible to select between 8 microcontroller driven timing modes. The default mode is no Jumpers installed in the J10 connector, position A, B, C and D. This mode is the standard ATX Supply mode.

Signal	Pin		Signal
Position A	1	2	Gnd
Position B	3	4	Gnd
Position C	5	6	Gnd
Position D	7	8	Gnd

In default mode the PSU behave as a traditional PC PSU with no ignition control (shutdown controller bypassed) and it can be used in non-vehicle computer applications. The other modes are for battery driven applications having different Off delay and +5VSB Off delay timings according to the following table.

Mode	A	B	C	D	Off Delay	5VSB Off Delay	Notes
0	:	:	:	:	0 sec	Forever	Standard ATX supply (Default)
1		:	:	:	5 sec	45 sec	Battery Driven Application Mode
2	:		:	:	5 sec	2 hours	Battery Driven Application Mode
3			:	:	5 sec	Forever (*)	Battery Driven Application Mode
4	:	:		:	30 sec	2 hours	Battery Driven Application Mode
5		:		:	30 sec	Forever (*)	Battery Driven Application Mode
6	:			:	30 min	Forever (*)	Battery Driven Application Mode
7				:	3 hours	Forever (*)	Battery Driven Application Mode

(*) This mode can drain the battery even though the PSU will automatically shut down when battery voltage is below 11.2V for more than 1 minute.

Switch (J8 and J9)

J8 and J9 are parallel connectors used to simulate a “Power On Button” signal. These outputs are left unconnected when the PSU is used in standard ATX Supply Mode (no Jumpers installed in J10). In stead the Motherboard Power On Button is implemented by separate push button contact in combination with BIOS settings like “Always-On”.

The output can be used in Battery Driven Application Mode (1 – 3 jumpers installed in J10) in order to start up motherboard automatically when power is connected to the PSU and SW turns to on for the first time. One of these outputs shall be connected to the Motherboard “Power On Button” input (Front Panel connector). The output will also be used to initiate shutdown procedure to save battery capacity. It is possible to add manual operated push button to one of connectors (J8 or J9).

Pin	Signal
1	Switch pin1
2	Switch pin2

AMP (J6)

The AMP connector can be used to remotely mute Audio Amplifiers etc. the first 4 seconds after PSU is turned. In general the AMP is not required to mute the motherboard audio system when the motherboard is booting. In stead the BIOS can silence the speaker system.

Pin	Signal
1	Gnd
2	RMT

The RMT signal is unconnected the first 4 seconds after PSU turns on and then it is connected to Vin.

ATX Connector (J7) ATX Power connector 20 pin (Molex P/N 39-01-2200).

Signal	PIN		Signal
+12V	10	20	5V
SB5V	9	19	5V
P_OK	8	18	nc
GND	7	17	GND
5V	6	16	GND
GND	5	15	GND
5V	4	14	PSON#
GND	3	13	GND
3V3	2	12	-12V
3V3	1	11	3V3

Control signal description:

Signal	Description
P_OK	Active high output signal indicating that the +12V, +5V and 3V3 are within operating limits.
PS_ON#	Active low input signal to turn on the power supply outputs.

ATX+12V Power Connector (J2)

Signal	PIN		Signal
GND	1	3	+12V
GND	2	4	+12V

Note 1: Use of the 4-pin ATX+12V Power Connector is required for operation of the 986LCD-M boards.

LED (J5) Connect a standard LED, no resistor required, to implement a “Power ON LED”. This option can be used instead of using a +3.3VSB power output on Motherboard Front Panel connector. When the PSU is used in Battery Driven Application Mode and when in State 2c, then the LED is flashing every 2 seconds.

Pin	Signal
1	LED -
2	LED +

Installation guide

Standard ATX Supply mode:

1. Make sure no Jumpers are installed in J10.
2. Connect the PSU ATX Connector to the Motherboard ATX connector via the ATX Cable. The cable kit can be mounted two ways, make sure it's done as requested.

   Please notice that for the 986LCD-M family:

   Four pins of the ATX Power Connector are not used, but the connector system is keyed so the DC-DC Power Supply can not be mounted in a wrong position. The ATX connector lock has no effect.

   The ATX+12V cable shall be connected.
3. Connect –V (J4) to a DC power source reference ground (black wire etc.) and connect +V (J1) to the DC 10 – 25V power source (red wire etc.).
4. Connect "Power" LED to J5 if required (not included in the 820153).
5. Connect HDD, CD-ROM, ADD or ADD2 card if required. If more power connectors are needed then standard HDD/floppy "Y" splitter cable can be used.
6. Turn on the Mother Board by using the Power On Button pin (pin 16) in the Front Panel Connector (alternatively short circuit pin 16 and pin 18 for half a second).

Battery Driven Application mode:

7. Mount Jumpers on J10 in according to requested delays.
8. Connect the PSU ATX Connector to the Motherboard ATX connector via the ATX Cable. The cable kit can be mounted two ways, make sure it's done as requested.

   Please notice that for the 986LCD-M family:

   Four pins of the ATX Power Connector are not used, but the connector system is keyed so the DC-DC Power Supply can not be mounted in a wrong position. The ATX connector lock has no effect.

   The ATX+12V cable shall be connected.
9. Connect –V (J4) to a DC power source reference ground (black wire etc.) and connect +V (J1) to the DC 10 – 25V power source (red wire etc.).
10. Connect the SW (J3) input to a "Turn On Switch" (via white wire etc.) so that SW is connected to Vin when system shall be able to turn on and is unconnected when system shall turn to off (after some delay) and then stay off.
11. Optional Connect J8 to the Motherboard "Power On Button" input (Front Panel connector) and optional connect J9 to a manual operated Push Button Contact.
12. Optional, connect "Power" LED to J5 (no LED kit is included in the 820153).
13. Connect HDD, CD-ROM, ADD or ADD2 card if required. If more power connectors are needed then standard HDD/floppy "Y" splitter cable can be used.
14. Turn on the Mother Board by using the Power On Button pin (pin 16) in the Front Panel Connector (alternatively short circuit pin 16 and pin 18 for half a second).

Specifications

Input Requirements

Battery Driven Application Mode: 12V battery, 11.2 -24V (down to 8V for a few seconds is accepted).

Standard ATX Supply Mode: 10 – 25V regulated, max=15A.

The power input is protected against over-voltage transients, short circuits (>15A) and in Battery Driven Application Mode the battery is protected against Deep Discharging.

Fuse: Littlefuse – MINIfuse 15A (Blue)

Voltage outputs

Output voltage	Max Load / [A] (Fan less)	Max Load / [A] (Forced air)	Peak Load / [A] (<60 sec.)	Regulation
5V	6	8	12	+/- 1.5%
5VSB	1,5	1.5	2	+/- 1.5%
3.3V	6	8	12	+/- 1.5%
-12V	0,11	0.15	0.2	+/- 5%
12V	5,25	7	9	+/- 2%

Output Power: 150W (forced air) and 120W (Fan less) maximum.

Peak Load power: 200W < 0.5 sec.

Efficiency: >94% at 10 – 16V in and 50% load.

Lifetime: MTBF=192K hours at 50 ºC.

Size: (L, W, H) = (160, 45, 35) mm

Operating environment: Temperature: -20 to 85 ºC. Relative Humidity 10 to 90% (non-condensing).

Shipping and storage: Temperature -40 to +90 ºC. Relative humidity 5 to 95% (non-condensing).

RoHS compliant.

Longevity: For Embedded market. Earliest EOL August 2011.

PCB UL mark: E154554